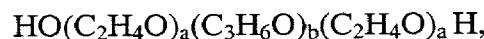


## WHAT IS CLAIMED IS:

1. An adjuvant, comprising:
  - a) a block copolymer of the general formula:
$$\text{HO}(\text{C}_2\text{H}_4\text{O})_a(\text{C}_3\text{H}_6\text{O})_b(\text{C}_2\text{H}_4\text{O})_a\text{H};,$$
wherein (b) represents a number such that the molecular weight of the hydrophobic POP portion ( $\text{C}_3\text{H}_6\text{O}$ ) is up to approximately 20,000 daltons and wherein (a) represents a number such that the percentage of hydrophilic POE portion ( $\text{C}_2\text{H}_4\text{O}$ ) is between approximately 1% and 40% by weight; and,
    - b) a cationic surfactant.
2. The adjuvant of claim 1 wherein subscript (b) of the general formula of the block copolymer represents a number such that the molecular weight of the hydrophobe ( $\text{C}_3\text{H}_6\text{O}$ ) is between approximately 9000 Daltons and 15,000 Daltons and subscript (a) of the general formula represents a number such that the percentage of hydrophile ( $\text{C}_2\text{H}_4\text{O}$ ) is between approximately 3% and 35%, preferably at or below 10%.
3. The adjuvant of claim 1 wherein subscript (b) of the general formula of the block copolymer represents a number such that the molecular weight of the hydrophobe ( $\text{C}_3\text{H}_6\text{O}$ ) is between approximately 9000 Daltons and subscript (a) of the general formula represents a number such that the percentage of hydrophile ( $\text{C}_2\text{H}_4\text{O}$ ) is between approximately 3% and 5%.
4. The adjuvant of claim 1 wherein subscript (b) of the general formula of the block copolymer represents a number such that the molecular weight of the hydrophobe ( $\text{C}_3\text{H}_6\text{O}$ ) is between approximately 12000 Daltons and subscript (a) of the general formula represents a number such that the percentage of hydrophile ( $\text{C}_2\text{H}_4\text{O}$ ) is approximately 5%.
- 30 5. The adjuvant of claim 1 wherein the block copolymer is CRL-1005.

6. The adjuvant of claims 1, 2, 3, 4 or 5 wherein the cationic surfactant is selected from the group consisting of benzalkonium chloride, benzethonium chloride, cetramide, cetylpyridinium chloride and cetyl trimethylammonium chloride.

- 5 7. A polynucleotide vaccine formulation, comprising:  
 a) a population of polynucleotide molecules; and,  
 b) an adjuvant, the adjuvant consisting of a block copolymer of the general formula:



10 wherein (b) represents a number such that the molecular weight of the hydrophobic POP portion ( $\text{C}_3\text{H}_6\text{O}$ ) is up to approximately 20,000 daltons and wherein (a) represents a number such that the percentage of hydrophilic POE portion ( $\text{C}_2\text{H}_4\text{O}$ ) is between approximately 1% and 40% by weight; and,

- 15 c) a cationic surfactant,  
 wherein a portion of the polynucleotide vaccine molecule population are associated with the adjuvant and the remaining portion of the polynucleotide vaccine molecule population are free within a pharmaceutically acceptable buffer.

- 20 8. The polynucleotide vaccine formulation of claim 7 wherein subscript (b) of the general formula of the block copolymer represents a number such that the molecular weight of the hydrophobe ( $\text{C}_3\text{H}_6\text{O}$ ) is between approximately 9000 Daltons and 15,000 Daltons and subscript (a) of the general formula of the block copolymer represents a number such that the percentage of hydrophile ( $\text{C}_2\text{H}_4\text{O}$ ) is between approximately 3% and 35%, preferably at or below 10%.

- 25 9. The polynucleotide vaccine formulation of claim 7 wherein subscript (b) of the general formula of the block copolymer represents a number such that the molecular weight of the hydrophobe ( $\text{C}_3\text{H}_6\text{O}$ ) is between approximately 9000 Daltons and subscript (a) of the general formula of the block copolymer represents a number such that the percentage of hydrophile ( $\text{C}_2\text{H}_4\text{O}$ ) is between approximately 3% and 5%.

- 30 10. The polynucleotide vaccine formulation of claim 7 wherein subscript (b) of the general formula of the block copolymer represents a number such

that the molecular weight of the hydrophobe ( $C_3H_6O$ ) is between approximately 12000 Daltons and subscript (a) of the general formula of the block copolymer represents a number such that the percentage of hydrophile ( $C_2H_4O$ ) is approximately 5%.

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11. The polynucleotide vaccine formulation of claim 7 wherein the block copolymer is CRL-1005.

12. The polynucleotide vaccine formulations of claims 7, 8, 9, 10 or 11  
10 wherein the cationic surfactant is selected from the group consisting of benzalkonium chloride, benzethonium chloride, cetramide, cetylpyridinium chloride and cetyl trimethylammonium chloride.

13. The polynucleotide vaccine formulation of claim 11 which is selected  
15 from the group consisting of D118, D118a, and D121.

14. A method of inducing an immune response in an mammalian host  
which comprises introducing the polynucleotide vaccine formulation of claim 7 into  
said mammalian host.

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15. A method of inducing an immune response in an mammalian host  
which comprises introducing the polynucleotide vaccine formulation of claim 8 into  
said mammalian host.

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16. A method of inducing an immune response in an mammalian host  
which comprises introducing the polynucleotide vaccine formulation of claim 9 into  
said mammalian host.

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17. A method of inducing an immune response in an mammalian host  
which comprises introducing the polynucleotide vaccine formulation of claim 10 into  
said mammalian host.

18. A method of inducing an immune response in an mammalian host which comprises introducing the polynucleotide vaccine formulation of claim 11 into said mammalian host.

5 19. A method of inducing an immune response in an mammalian host which comprises introducing the polynucleotide vaccine formulation of claim 12 into said mammalian host.

10 20. A method of inducing an immune response in an mammalian host which comprises introducing the polynucleotide vaccine formulation of claim 13 into said mammalian host.

15 21. A polynucleotide vaccine formulation, comprising:  
a) a population of polynucleotide molecules; and,  
b) an adjuvant, the adjuvant consisting of a block copolymer of the general formula:



wherein (b) represents a number such that the molecular weight of the hydrophobic POP portion ( $\text{C}_3\text{H}_6\text{O}$ ) is up to approximately 20,000 daltons and wherein  
20 (a) represents a number such that the percentage of hydrophilic POE portion ( $\text{C}_2\text{H}_4\text{O}$ ) is between approximately 1% and 40% by weight;

- c) a cationic surfactant; and,  
d) a non-ionic surfactant

wherein a portion of the polynucleotide vaccine molecule population  
25 are associated with the adjuvant and the remaining portion of the polynucleotide vaccine molecule population are free within a pharmaceutically acceptable buffer.

22. The polynucleotide vaccine formulation of claim 21 wherein  
subscript (b) of the general formula of the block copolymer represents a number such  
30 that the molecular weight of the hydrophobe ( $\text{C}_3\text{H}_6\text{O}$ ) is between approximately 9000 Daltons and 15,000 Daltons and subscript (a) of the general formula of the block copolymer represents a number such that the percentage of hydrophile ( $\text{C}_2\text{H}_4\text{O}$ ) is between approximately 3% and 35%, preferably at or below 10%.

23. The polynucleotide vaccine formulation of claim 21 wherein  
subscript (b) of the general formula of the block copolymer represents a number such  
that the molecular weight of the hydrophobe ( $C_3H_6O$ ) is between approximately 9000  
Daltons and subscript (a) of the general formula of the block copolymer represents a  
5 number such that the percentage of hydrophile ( $C_2H_4O$ ) is between approximately 3%  
and 5%.

24. The polynucleotide vaccine formulation of claim 21 wherein  
subscript (b) of the general formula of the block copolymer represents a number such  
10 that the molecular weight of the hydrophobe ( $C_3H_6O$ ) is between approximately  
12000 Daltons and subscript (a) of the general formula of the block copolymer  
represents a number such that the percentage of hydrophile ( $C_2H_4O$ ) is  
approximately 5%.

15 25. The polynucleotide vaccine formulation of claim 21 wherein the block  
copolymer is CRL-1005.

26. The polynucleotide vaccine formulations of claims 21, 22, 23, 24 or 25  
wherein the cationic surfactant is selected from the group consisting of benzalkonium  
20 chloride, benzethonium chloride, cetramide, cetylpyridinium chloride and cetyl  
trimethylammonium chloride.